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ABSTRACT

The purpose of this study was to measure and analyze viewers' electroencephalographic reactions to motion and still pictures, and to increase knowledge on the differential impact of the two modes on brain wave production. Since beta brain wave indicates focused attention, an additional purpose was to determine whether the two media differed significantly in their potential as teaching devices as measured by the viewers' beta brain wave production. Portable biofeedback equipment was used to collect data on 60 randomly selected subjects. Treatments were either a motion picture or a slide tape presentation, alternately shown to each subject. Using a two-way analysis of variance and a post hoc analysis, no significant main effects or interactions were identified. Neither motion nor still pictures differentially affected the production of beta waves, which are necessary for focused attention and mental concentration. The experiment did demonstrate the successful use of a psychophysiological measuring device which offers the opportunity to measure an individual's reactions to instructional media unobtrusively. (LMM)

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THE EFFECT OF MODE OF VISUAL PRESENTATION (MOTION vs. STILL) ON THE BRAIN WAVE PRODUCTION OF COLLEGE STUDENTS

by

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Introduction

Research comparing motion and still pictures has had conflicting results. Generally speaking, criterion or achievement tests and attitude scales for measuring the effectiveness of one medium over another have produced these mixed reports. The technology now exists for measuring psychophysiological reactions to mediated programs. Certain physiological conditions, such as the electrical output of the brain, indicate different mental or psychological conditions. These conditions can be measured unobtrusively and since relationships exist between physiological and psychological states, psychophysiological measures may prove to be more accurate and direct ways of measuring the effects of different media. Lawrence (1972, pp. 1-155) contended that "current theories of learning do not take brain waves into account. Yet, scientists have shown that brain waves differ and such factors as attention are definitely linked to brain wave states. One rhythm may be best suited for memorizing the multiplication tables, while another brain rhythm may be best suited to creative outpourings like writing poetry, or painting a landscape."

Vogel and Broverman (1968) argued that since numerous independent factors of intelligence were known, relationships between psychophysiological states such as electroencephalogram (E.E.G.) and particular mental abilities were more meaningful. Mental concentration in human beings is indicated by the presence of beta brain waves, which have a frequency of 13 to 26 cycles per second. Therefore this research used E.E.G. to establish comparative effects of motion pictures versus still pictures on learner's brain waves.

Purpose of the Study

The purpose of this study was to measure and analyze viewers' electroencephalographic reactions to the audiovisual formats of videotape (representing a motion picture variable) and slide, audiotape (representing a still picture variable), and to increase our knowledge of the differential impact of motion and still modes on brain wave production. Since beta brain wave indicates focused attention, an additional purpose of this research was to determine if the two media differed significantly in their potential as teaching devices as measured by the viewers' beta brain wave production. This study used portable biofeedback equipment to collect data. Burtschi (1978) maintained that biofeedback equipment is underutilized in educational research.

In order to establish an experimental rationale, the following hypothesis was developed: There is no significant difference in E.E.G. scores, as measured by portable biofeedback equipment, between groups who view still and motion pictures.

Interpretation of Collected Data

In order to fully understand the meaning of the collected data, an explanation of data sources is necessary. Although electrical waves are produced from the entire cerebral cortex, the waves measured during the treatment session were those emitted from the occipital lobe. Signals received by the eyes are transmitted to the occipital lobe and translated into information the brain can use. Hence, physicians and researchers often refer to the occipital lobe as the "vision center" of the brain.

Therefore beta brain wave production during the treatment session was thought of as a "score" on a "test". However, it was important to remember that

the score was not comparable to an achievement test score where the test taker received one "point" for each "correct" item. Rather, the resultant scores were an average of microvolt seconds of beta wave production during the data collection period. If a subject received a score of 175 during one of the treatments, this did not refer to the number of correct responses, but to the amount of averaged microvolts per second that he or she had spent producing beta waves during the treatment. The score only had meaning when compared to the score of the alternate treatment.

Since the E.E.G. recorder used in the study was designed for alpha experiments and training, the controls were adjusted to collect or monitor alpha, theta, delta waves and whatever "noise" is present. Hence, the greater amount of time spent in alpha, the less time spent in the desired beta and vice versa. Therefore, the lower the "score", the more time spent in beta wave. In conclusion the E.E.G. "score" cannot be thought of as a typical test result, but must be given consideration as a more innovative method for measuring the success of the treatment.

Methodology

Sixty randomly selected subjects were randomly assigned to two treatment groups. The two experimental treatments one, a motion picture presentation and the other a slide tape presentation were alternately shown to each subject. This procedure created two experimental groups the group which received the motion picture treatment first and the still picture second, (M_1 - S_2) and the group which received the still picture treatment first and the motion picture treatment second, (S_1 - M_2).

The derived data were subjected to a two-way analysis of variance. No

significant main effects or interactions were identified. The data were then subjected to a post hoc analysis using t test procedures, with the results reported below.

Table 1

treatment comparison	t value	2 tailed probability
M_1 - M_2	-0.62	0.540
M_1 - S_1	-1.21	0.236
M_1 - S_2	-1.15	0.260
S_1 - S_2	.84	.411
S_1 - M_2	2.23	.034
S_2 - M_2	-0.23	.817

While there was a significant difference beyond the .05 level for the for the comparison S_1 - M_2, this comparison refers to the order in which the treatments were administered to a randomized group. This was not sufficient evidence for rejecting the null hypothesis. Since no significant differences were found between M_1 and S_1 or M_2 and S_2, the null hypothesis ($H_0 : X_m = X_s$) was retained.

Neither motion nor still pictures differentially affect the production of beta waves, which are necessary for focused attention and mental concentration. Although there was a significant difference found between S_1 and M_2 but not for any of the other comparisons referring to the order of treatments, no conclusions were drawn pertaining to the order in which the presentations were shown to subjects. Therefore, the null hypothesis was retained.

Discussion

Some researchers have suggested that what is in question is not which medium is more effective, but how the traits and aptitudes of the individual interact with the treatment or medium. More research on the subject is necessary. And part of that research should be aimed at new ways of measuring the effects of various media.

Research comparing the media attributes of motion picture and still picture has been inconclusive. Both gross comparisons and the so-called aptitude or trait and treatment interaction studies have produced conflicting results. Psychophysiological measurement offers the opportunity to unobtrusively measure an individual's reactions to instructional media. Although this experiment found no evidence to show that still pictures are more effective than motion pictures in eliciting the type of brain waves (beta) indicative of focused attention, the experiment did demonstrate the successful use of psychophysiological measuring devices in media research.

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